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Erasmus+ Programme  
of the European Union



## Project “Improving skills in laboratory practice for agro-food specialists in eastern Europe» (Ag-Lab)

Program Erasmus +, project KA2 n° 586383-EPP-1-2017-1-SI-EPPKA2-CBHE-JP (2017-2978/001-001)

### Objectives:

- to complete the diploma in production and processing of animal products with the knowledge and skills necessary for the work at laboratory according to the elaborated references / professional competences;
- to provide the comprehension of laboratories organisation and activities;
- to provide the knowledge of actual laboratory methods and national and international norms related to the laboratory practice and to develop the capacity for the permanent up-grading of professional knowledge;
- to reinforce relations between universities and laboratories in agro-food sector and to create the conditions for the sustainable cooperation through the web-portal and other means.

### Methods:

- the theoretical and practical classes in form of modules integrated into curricula (30% of the general curriculum);
- the practical trainings and study visits to laboratories of national and foreign institutions ;
- the on-line lectures;
- case-studies.

### Quality assurance:

- the examination in the end of every course with the results reflected into the supplement to the diploma (modules, number of hours and notes);
- the tests of knowledge before the training study visit and after it;
- the evaluation of the provided training quality by students (clearness, completeness, practical usefulness etc.) with the further work for the improvement;
- the questioners for unit heads of the laboratories after receiving students for the practical training;
- the report of the common lectures and trainings with universities;
- further feedback of gradulators launching their professional activities at laboratories.

## Modules for the specialization “Laboratory practice in production and processing of animal products”

Module / Subject
<b>Module 1. Activity organization and metrological provision of laboratory</b>
<b>Topic 1.</b> Organization and functioning of laboratories (general requirements for laboratories): GPL – good laboratory practice, certification and accreditation of

laboratories, metrological provision, international standards ISO 17025, ISO 9001, ISO 14001, ISO 45001, biosecurity levels in laboratory, European regulation related to the laboratory practice).

**Topic 2.** Procedures for confirmation of laboratory diagnostic efficiency (internal and cross audit, verification), quality assurance of laboratory researches (intra and inter-laboratory control). Validation of analytical methods.

**Topic 3.** Rules of the laboratory biosafety and use of biological materials and samples in researches. Organization of measures for recycling of laboratory wastes, used samples, materials and chemical agents.

**Topic 4.** Documents management at food enterprise and food stuffs control laboratory (necessary documents, software for documents management and registration, registers, experts' conclusions).

## **Module 2. Organization of chemical analytical researches**

**Topic 1.** Sampling. Identification of samples species. Normative and legal requirements. Different sampling techniques.

**Topic 2.** Preparation for analysis. Choice of analytical methods (factors to be taken into account). Reception of information related to the method acceptability. Defining of reasons of no-sufficient results.

**Topic 3.** Validation of analytical methods, defining of validation level. Validation report and documents management.

**Topic 4.** Measures for laboratory researches quality assurance at pre-analytical, analytical and post-analytical stages. Procedures for calibration and verification of measurement equipment.

## **Module 3. Modern analytical methods and equipment**

**Topic 1.** Characteristic of volume – analytical research methods. Quantitative matters definition by chemical method. Titrimetric method of analysis. Main reactions used in volume analysis.

**Topic 2.** Electric and chemical research methods. Principles of the potentiometry method. Peculiarities of conductometry method.

**Topic 3.** Methods of electrophoretic analysis. Principles of electrophoresis, zonal electrophoresis, immuno-electrophoresis and iso-electric focusing. Fulfilling of electrophoresis on polyacrylamide gel. Dilution of albumins in polyacrylamide gel according to their molecular weight.

**Topic 4.** Optic analytical methods. Equipment used for the spectrometry. Definition of anisidine index by spectrophotometry.

**Topic 5.** Photo-colorimetry and spectrophotometry in ultra-violet, visible and infra-red fields. Laboratory equipment used for these researches. Definition of acid index.

**Topic 6.** Spectrofluorometry, its allocation for expert and control analysis. Fluorescence, effect of fluorescence. Fluorescent probes. Spectrofluorometry of amini-acides, albumins, nucleonic acid.

**Topic 7.** Refractometric analytical method. Types of refractometers. Definition of refraction index.

**Topic 8.** Atomic-absorption spectrometry and atomic-emission spectral analysis applied

for quality and safety control of products of animal origin. Peculiarities of atomic – fluorescent spectroscopy. Mass-spectrometry and its application.

**Topic 9.** Detection of heavy metals in animal products.

**Topic 10.** Detection of pesticides residues in foodstuffs by gas chromatography.

#### **Module 4. Biotechnology of reproductive cells**

**Topic 1.** Actual biotechnologies of animals reproduction and requirement to laboratory equipment.

**Topic 2.** Cytology (types of equipment).

**Topic 3.** Physiology and biochemistry of agricultural animals reproducers' semen.

**Topic 4.** Theoretical bases and practical skills for the dilution of reproducers' semen (equipment).

**Topic 5.** Hormonal regulation of sexual cycle.

**Topic 6.** Reproduction on cellular level (equipment).

**Topic 7.** Embryogenesis.

**Topic 8.** Technology of the work with embryos (equipment).

**Topic 9.** Fertilization of cells in vitro (equipment).

**Topic 10.** Incubation of cells in vitro (equipment).

**Topic 11.** Cryo-conservation of reproductive cells, embryos (equipment).

**Topic 12.** Reasons of cells damage at freezing, defrosting and cryo-conservation.

**Topic 13.** Biotechnology of sex-regulation at obtaining animals by bio-technological methods (equipment).

#### **Module 5. Practice of application of the modern recommendation of ICAR**

**Topic 1.** International agreement related to the registration of agricultural animals (ICAR). Rules of ICAR, standards and recommendations related to the methods of productive indices identification and recording. Necessary laboratory equipment.

**Topic 2.** Application of ADN-technologies and other methods in animal husbandry. Molecular genetics. Verification of origin and paternity. Molecular and genetic information for breeding schemes with the application of markers. Rules and recommendations of ICAR for ADN testing of origin at animals (laboratory equipment).

**Topic 3.** Recommendation of ICAR on evaluation methods of productivity and body constitution of dairy animals. Linear indices of type. International standard indices.

**Topic 4.** Standard methods of ICAR genetic evaluation. Systems of genetic evaluation of dairy cattle. Genetic defects. Categories of bulls reproducers. Evaluation stages. International evaluation.

**Topic 5.** Recommendation of ICAR on evaluation methods of body constitution of meat animals. Linear indices of type. International standard indices. Standard evaluation of quality indices.

**Topic 6.** Recommendation of ICAR on evaluation methods of body constitution of milk goats. Linear indices of type. International standard indices. Standard evaluation of quality indices.